LECTURE

Industrial College of the Armed Forces
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Soviet Industry

It is a great pleasure to return to the Industrial College of the Armed Forces after several years absence and to have the opportunity to talk to you about Soviet industry.

Shaped in the forge of Soviet economic and political policies, industry in the USSR largely reflects the priorities of those policies. As a result, it is full of impressive strengths, but at the same time it is shot through with weaknesses that promise to become more serious in the 1970's than they have been in the 1960's. Soviet industry turns out an array of first rate military and space equipment, but it produces civilian products that are unsurpassed, among advanced economies, for shoddiness, bad design, limited variety, and short service life.

How did it all happen? Almost from the seizure of power in 1917, industrialization has been the cornerstone of Soviet economic policy. Not the industrialization experienced in the West, however, but rapid, forced-draft industrialization -- growth at any cost -- was decreed to assure the survival of the USSR and,

according to the ideology, Communism's eventual world-wide triumph.

Forty years ago Stalin launched the first five-year plan, giving priority to the development of heavy industry, that is, producers goods and military equipment. This elementary priority has been essentially maintained ever since. The corollary of rapidly building up heavy industry is, of course, the downgrading of the consumer goods industries as well as housing and services. The Soviet people were told, and are still told, that the good things of life will come in abundance with the final triumph of communism. Although the production of consumer goods has increased in recent years, even the Soviets admit they are still far from the promised land.

Producers Goods Industries

As a result of unrelenting implementation of this single-minded set of priorities, Soviet industrial output as a whole has grown to a little over half that of the United States. The picture, of course, is a very mixed one. The overriding priority accorded heavy industry has resulted in a level of current production that is not too far behind the United States.

[Slide 1. USSR vs. United States: Comparative Output of Producers Goods Industries, 1967]

1. As you can see, Soviet output in these five producers goods industries -- and I include electronics because of its military importance even though it is not strictly a producers good -- is not too far from that of the United States.

2. More precisely, Soviet production in 1967 ranged from about two-thirds of ours for electric generators and electronics to substantially more than ours for cement and machine tools. Steel output, as you can see, stood at close to 90 percent of ours, although I should note that the United States had substantial capacity in reserve, whereas the USSR had none.

3. There are some other things that need to be said about the statistics you have just seen. The figures for machine tools are measured in units. By this measure the USSR is the world's largest producer of machine tools, with production of metalcutting and metalforming machine tools about 70 percent higher than in the United States. If the comparison is made in value terms, however, the Soviet machine tool output is considerably below that of the US: An estimate made

by McGraw-Hill values the Soviet output last year at slightly under 50 percent of US production. These great discrepancies in quantity and value comparisons reflect differences in the productivity, quality, and product mix of machine tools.

4. Turning to cement, Soviet practice is to build extensively with reinforced concrete panels. The contrasting wider use of brick, tile, and other wall materials in this country largely explains the Soviet lead in cement output.

Defense Industries

Within heavy industry the highest priority has been given to the defense industries. They have gotten the best production facilities, the best material inputs, and the best of the scientific brainpower. With a GNP of a little less than half that of the United States, the Soviets have mounted a defense effort that nearly matches ours in quantity, and in quality is much nearer ours than it is in investment goods or consumer products. Even in peacetime they devote a large share of their machinery capacity to the production of military-space equipment -- we think about 40 percent, compared with about 25 percent in the United States.

Consumer Goods Output

As I have mentioned, Soviet consumer goods production is unimpressive, compared with the relatively favorable showing of the producers goods and defense industries. Consumer durables, such as washing machines and refrigerators, which are often produced as sidelines by heavy machinery plants, suffer from the second-class resources --men, money, and materials -- employed in their manufacture.

[Slide 2: USSR vs. United States: Comparative Inventory of Consumer Durables]

1. These data are inventories of various consumer goods in the two countries at the end of 1966. To provide a measure of consumer welfare, they have been converted to a per capita basis -- specifically, to units per thousand persons.

2. The great gap in automobile production is well known. Even if the USSR reaches the 1970 goal of turning out 600,000 passenger cars, which looks increasingly doubtful, individual transportation will remain scarce in the USSR for a long time to come.

3. The inventory of other consumer durables shown is a small fraction of that which US households enjoy.

With respect to food and clothing, the Soviet food processing and textile industries are technologically backward and turn out products greatly inferior to those of the United States by almost any measure.

The Quality Factor

All of these numerical comparisons between the USSR and the United States show the Soviet Union in a better light than it deserves, however. For one thing, the United States produces a far greater variety and assortment of products than the USSR, and it produces many kinds of products that are not produced in the USSR at all. This abundance also means that US consumers enjoy a certainty of supply, the absence of which is one of the enduring hallmarks of Soviet society. Finally, there is the matter of quality. The USSR is notoriously inferior in this regard even with respect to products of the favored producers goods sector. For example, relative to the United States, Soviet tractors are considerably underpowered and have a shorter service life. Soviet tires give from half to two-thirds as many miles of wear as US tires. US delegations that have visited the USSR all agree that Soviet machine tools are less durable, slower, less precise, and more prone

to breakdown than US counterparts. There are even many examples of complaints from the less developed countries about the poor quality of the Soviet equipment that they get under aid agreements.

As for consumer goods, the problem is even worse. In general, Soviet durables such as automobiles, washing machines, and refrigerators resemble those produced in the United States in the 1930's. And even these are of poor quality, judging from the constant complaints voiced in the Soviet press. Breakdowns are frequent, spare parts scarce, and repair services inadequate. The fact that consumers rush to buy shoes imported from Eastern Europe testifes to the comparative inferiority of the Soviet shoe industry even within the Socialist camp. Equally dramatic is the excellent reputation and resulting scarcity of consumer items from the USSR's Baltic republics. Although relatively high-priced, these goods disappear rapidly from the shelves, and in some cases have even become status symbols.

The Technological Gap

Related to all of the foregoing is the serious technological lag of the USSR behind the United States and Western Europe. The Soviets' backwardness in

researching and developing new technology for themselves is a notorious weakness of their system. As a result they have had to buy, borrow, and steal technology extensively from the West, and their only real hope of closing the gap is to continue to do so. Their greatest technological lag is in such areas as advanced microelectronics, computers, test instrumentation, and avionics. We estimate that this gap is going to become increasingly critical for the development of their advanced weapons and space programs.

To be specific, let me spend a few minutes on computers. The USSR lags perhaps 5 years behind the United States in third-generation computer development. The Soviet Union has no third-generation computers today of its own manufacture, and it is badly lacking in high speed central processors, electro-mechanical peripheral equipment, high quality magnetic tape, and the software needed for data handling systems. As you know, modern military logistics systems, command-control systems such as NORAD's, and ABM systems of the NIKE-X type, require large, fast multiprocessor computer systems, operating in real time.

The Soviets now plan to build IBM-compatible computers which will have integrated circuits. Such

components are necessary in very large systems such as the IBM-360/92, which contains on the order of a million circuit elements. The NIKE-X system, if built, will require 12 or more processors, each equal in size to the 360/92. All integrated circuits in an ABM system must be of military quality, but very many more than 12 million integrated circuits would have to be produced in order to select 12 million of high quality for an ABM application. At the present time the USSR has not even mastered the large-scale production of commercial-grade integrated circuits.

The computing power of Soviet computers in current production may or may not be adequate to operate a single ABM system, the one now deployed around Moscow. The enormous military requirements for computers is illustrated by the fact that our Atomic Energy Commission has a computer capability about equal to the total that exists in the USSR, and our National Security Agency about 10 times the total Soviet computational capability.

Not only is their hardware inferior, but the Soviet computer industry provides virtually no service-after-sale to its customers. For this reason the demand for Soviet computers in Eastern Europe has been nil. Let

me give you an example: In pre-invasion Czechoslovakia, where about 40 Soviet computers were acquired under political pressure, the users formed an association, purchased non-Soviet peripheral equipment (mostly from the Free World), exchanged experiences on maintenance, and developed a library of software superior to anything available from the factory. The Soviets themselves have been trying to get access to this software, thus far without results -- so far as we know.

The USSR is desperately trying to close the gap and reach the US in computer technology, but it has virtually no chance to do so unless it can obtain direct access to US production technology. This it is currently trying to do through a licensing arrangement with the United Kingdom. We are, of course, trying to prevent any such windfall from taking place.

The Present Importance of Soviet Industry in the Economy

I turn now to the question of the position of Soviet industry in the economy. A useful measure of the importance of Soviet industry's position in the economy relative to other sectors is the share of basic productive factors -- capital and labor -- at its command.

Of the total undepreciated stock of plant and equipment in the Soviet Union at the end of 1967, more than half was classified as industrial. Industry's holdings of plant and equipment increased 6 times between 1950 and 1967. Because of this tremendous post-war increase, the average age of the Soviet industrial plant is relatively young -- somewhere around 10 years. Furthermore, it is operated more intensively than the US industrial plant.

Clearly the Soviet leadership has poured investment resources into industry in pursuit of economic power. Over the years, industry has gotten the lion's share of total investment, and other sectors of the economy have been the residual claimants.

[Slide 3: USSR vs. United States: Distribution of Total Gross Fixed Investment, 1951-66]

1. This set of priorities shows up clearly in a comparison with the United States. We estimate that annual investments in Soviet industry now exceed those in the United States by about one-fifth.

2. As you can see from the chart, the service sectors and housing have been neglected relative to the United States. Indeed, the sorry state of Soviet

housing goes a long way toward explaining the sharp drop in the Soviet birth rate in recent years.

With respect to labor, between 1950 and 1967 the Soviet industrial labor force almost doubled. I have some comparative figures on the next slide.

[Slide 4: USSR vs. United States: Comparative Civilian Labor Force, 1967]

1. First, we can see that the Soviet civilian labor force, at 120 million persons, is about 50 percent larger than ours. However, when we subtract the agricultural labor force -- an area of notorious Soviet underinvestment and inefficiency -- the remaining subtotal (or non-agricultural work force) is about the same in the two countries. Many of these people in the USSR, however, are employed in what we would consider WPA or "make-work" jobs.

2. Soviet industry employs about 9 million more persons than its US counterpart, or nearly one-half more.

3. More than a third of the industrial labor force is employed in machine building, making it the single largest branch in this respect in the USSR. The next two largest branches, significantly, are light industry,

with 16 percent of the industrial labor force, and the food industry, with 9 percent. These two branches are the most labor-intensive in Soviet industry; conversely, they have traditionally been slighted in the allocation of capital investment.

4. The highly developed nature of the services sector in the United States is shown by the fact that 48 percent, or nearly half of the civilian labor force, is engaged in trade and services. By contrast, this figure is only 24 percent in the USSR.

These comparative figures I have been showing you tell us nothing about the relative efficiency with which the USSR uses the huge capital and manpower resources that it has allocated to industry. We estimate that Soviet industrial labor productivity is only about two-fifths of ours, and that the productivity of labor and capital together is only about half of ours. Clearly they are a long way from catching up with us in this area, despite the overwhelming priority that industry has had from the beginning.

The Organization of Civilian and Defense Industries

Next I would like to describe briefly how Soviet industry is organized and administered. As you

undoubtedly know, Soviet industry has always been administered in a highly centralized manner. Production goals are set at the top and passed down to enterprises as commands. The various branches of industrial production are formally organized under the administrative supervision of 31 government ministries. Those of greatest strategic importance are organized as all-union ministries. This means that their subordinate producing units are directly controlled by the parent ministry in Moscow.

There are 20 all-union ministries, 19 of which administer the huge complex of activities that the Russians call the machinery and metal working industry. In addition to producing investment goods and consumer durables for the civilian economy, the 11 civilian engineering ministries also supply end-products such as motor vehicles and power equipment directly to the military establishment, and they manufacture producers equipment -- machine tools, heavy presses, and the like -- to specifications of the defense industry plants.

Eight of these all-union ministries control the activities of plants producing military-space hardware. I have a chart showing the defense industry ministries.

[Slide 5: USSR: Organization of Defense Industry Ministries]

1. All of these ministries receive their production programs directly from the Soviet Ministry of Defense and are accorded every consideration in the distribution of productive resources once the programs have been set.

2. The Ministry of the Defense Industry is primarily engaged in the production of land armaments.

3. The Ministries of the Aviation Industry, Shipbuilding Industry, Radio Industry, and Electronics Industry supervise the production of military and defense-related items you would expect from their titles.

4. The Ministry of Medium Machine Building is the euphemistic name of the ministry that presides over the production of nuclear weapons (or possibly only the nuclear devices in such weapons).

5. The Ministry of General Machine Building, an old name for a newly reconstituted ministry, is believed to control the production of strategic ballistic missiles for Soviet military and space programs.

6. The Ministry of Machine Building, a new ministry founded this year, has successfully veiled its activities from us so far.

In addition to the 20 all-union ministries there are 11 ministries organized on a union-republic basis. This means that administrative control is divided between Moscow, representing the interests of the economy as a whole, and the particular republics where the producing units are concentrated. The branches of industries concerned are mostly those producing raw materials, such as fuels and metals, and consumer goods.

The Growth of Soviet Industry and Its Comparative Performance

I will now move on to discuss the growth and comparative performance of Soviet industry. In the 17 years between 1950 and 1967, Soviet industrial output nearly quadrupled, averaging an increase of 8! percent per year. We use 1950 as the base year in analyzing postwar Soviet industrial growth because restoration of the industrial plant from the ravages of World War II was generally completed by that year. Impressive as this sounds, you may recall that a moment ago I said that industry's stock of plant and equipment increased 6 times during the same period. This means that the growth of output lagged well behind that of capacity; this is another indication of the inefficiency of Soviet industry.

By breaking the 1950-67 period down into shorter segments some useful insights into the pattern of Soviet industrial growth emerge. The highest rates were achieved during 1951-55 when the annual increase of industrial production averaged nearly 11 percent, but this rate dropped markedly during the next five years to an average of 8-1/2 percent annually. The first half of the 1960's was marked by another sharp decline in growth to an average of 6-1/2 percent per year. In 1966-67, however, the growth rate improved marginally to about 7-1/2 percent per year.

You may be interested in how Soviet industrial growth compares with our own performance in the post-war period.

[Slide 6: USSR vs United States: Comparative Industrial Growth, 1950-67]

1. This chart compares Soviet industrial output with that in the US on an index number basis, using 1960 as the base of 100 in each country.

2. You can see that our industrial growth during the 1950's was poking along, while that of the USSR was growing rapidly. The average annual figures for the decade as a whole were 4 percent for the United States and 9-1/2 percent for the Soviet Union.

3. The 1960's has seen a reversal of this earlier pattern, although the Soviet growth rate still slightly exceeds ours. The US rate accelerated to 5-1/2 percent for the 1961-67 period, while the Soviet rate dropped to 7 percent. Although they have been gaining a little, their level of industrial output in value terms is still only about half of ours.

Reasons for the Slowdown in Industrial Growth

Now I want to turn to an examination of the reasons for this pronounced slowdown in Soviet industrial growth that shows up so clearly by everybody's measures, even by the Soviet government's own manipulated statistics. In a nutshell, the reasons have to do solely with explaining the very sharp drop in the efficiency with which resources were used in industry beginning in 1959-60. This can be measured by what we call factor productivity, which means the amount of output yielded by each unit of capital and labor input. This drop in efficiency can be seen very clearly from the figures in the next slide.

[Slide 7: USSR: Average Annual Rates of Growth in Productivity and in Inputs of Resources in Industry, 1950-67]

1. For the period 1951-60, productivity in Soviet industry increased at an average annual rate of about 4.7 percent. The rate was actually higher during the second half of the decade than during the first half, but it began to decline after 1959, with the 1961-65 average only 1.3 percent. Performance improved a little thereafter to 2.4 percent in 1966-67, but it has not regained the old level by a wide margin.

2. On the right hand side, you can see that the physical inputs into industry -- labor and plant and equipment -- have held up fairly well over this period. Therefore, the decline in Soviet industrial growth after 1960 was associated almost entirely with how well these resources were used -- that is, with problems affecting efficiency.

The quite sudden and near collapse of productivity growth is a complex phenomenon that we still understand only vaguely. The upsurge of defense expenditures and the reduction of the workweek from 46 to 41 hours in 1959-61 surely contributed to the magnitude and timing of the drop in productivity. The direct effect was a loss of labor and capital inputs into the civilian economy. Indirectly, by preempting for the advanced weapons programs the best

of the research and development resources -- materials and plant and manpower -- the defense effort further contributed to the drop in the efficiency of new investment. Finally, the reduction in the workweek, which managers were ordered to carry out without reducing output, must have resulted in the using up of all of the easy opportunities for increasing efficiency at the plant level; that is, all of the "hidden reserves" that the Soviets are fond of talking about may have been "uncovered" at least temporarily. Finally, efficiency was adversely affected by the sharp cut in the rate of retirement of old plant and equipment that occurred during the early 1960's to offset a sharp drop in the rate of increase of new investment. Repair costs mounted sharply. Clearly, old, overhauled equipment does not contribute much to growth in efficiency.

In a broader sense, however, the slowdown in productivity appears to be associated with something much more fundamental -- the inability of the Soviet command-administered system to cope with technological change and complexity.

Much of the pre-war growth of Soviet industry was the result of borrowed technology from the West. In

general, this approach paid off handsomely in terms of economic growth, aided by the relatively simple product mix (steel, coal, electric power, and the like) plus an almost unlimited demand for industrial goods. In the 1950's, however, Soviet leaders came to realize that, while they had built up their basic industries, something of a technological revolution had occurred in the West following World War II and the USSR, effectively hidden behind its rusting Iron Curtain, had not shared in it. The command went out from Khrushchev, beginning about 1958, to learn from the capitalists in all ways possible. It is clear that Khrushchev, himself a product of the Soviet industrial success story, expected to take the new technology from abroad, apply the time-tested Soviet formula to it, and out-produce the capitalist economies theoretically handicapped by the constraints of the market system.

What happened was quite otherwise. In typical Soviet fashion the mastery of new technology took on the status of a campaign, one of the most notorious examples of which was Khrushchev's program to "chemicalize" the Soviet economy. This program called

not only for a sharp increase in investment in the domestic chemical and supporting industries but for the import of large amounts of modern plant and equipment as well. Planners were ordered to plan the production of new products with which they had had no experience; designers were ordered to design new plants and processes unlike any they had ever tackled; equipment manufacturers were ordered to produce types of equipment for which they lacked know-how. The result for the chemical industry was an acute case of indigestion, and productivity of capital and labor actually declined in 1962-64. New capacities were hurriedly built, but output from them was slow to materialize. The same was true of the plants embodying new technology imported from the West, particularly once the Western technicians departed the scene.

The problems in other branches of industry were similar though less spectacular. In the clothing and textile industries, for example, plants found it difficult to adapt the product mix in accord with the changing preferences of consumers. Inventories of shoddy and unsaleable consumer goods started to pile up.

At the heart of these difficulties was the matter of incentives. For decades the performance of Soviet enterprises and the bonuses for their managerial personnel had been tied to fulfillment of annual plans for gross value of output, and then for a brief period to fulfillment of plans for cost reduction. Naturally, managers tried to maximize quantity of output, paid little attention to product quality, and dragged their feet on introducing new products and new technology -- which temporarily raise costs and detract from current production. To try new things meant interruptions of production in the short run and loss of bonuses. Special bonus schemes for rewarding innovation were of little avail.

Finally, I should mention the strain on industry brought about by the military-space programs. While Soviet defense expenditures as a whole were not rising very fast in the first half of the 1960's, the character of the effort was shifting rapidly toward research and development of more and more sophisticated weapons and space vehicles. The high quality resources that are poured into defense production are pretty much wasted. That is, to the extent that industrial growth is oriented toward

defense it is not contributing much to the growth of consumption and investment, and thereby to future productivity growth. In 1966-68, moreover, the defense effort has started to accelerate again.

The Economic Reform

The mounting evidence of serious economic malaise even in the long-favored industrial sector must have greatly alarmed the Soviet leadership. The traditional development strategy and institutional arrangements seemed to be increasingly unsuitable for today's problems. Certain Soviet economists began talking about giving enterprises more latitude to make decisions and changing incentives to emphasize sales and profits. Toward the end of his rule Khrushchev even permitted a few experiments along these lines. And after his ouster Brezhnev and Kosygin launched a full-scale, so-called "reform" in industry, on which they pinned their hopes for substantial gains in efficiency.

The reform is a very complicated affair, but essentially it boils down to this:

1. Khrushchev's regional economic councils set up in 1957 were abolished and the former system of industrial ministries was reestablished.

2. Enterprise managers are given a little more freedom to make plans and operate their enterprises.

3. Fulfillment of plans for sales, profits, and profitability (return on capital) is now the basis for managerial bonuses.

4. Enterprises must now pay interest on their capital, which they used to get free.

5. Industrial prices were revised to bring them nearer to production costs and to make most enterprises profitable.

The new ministries were quickly set up in late 1965, but the rest of the reform has been carried out slowly over the past 3 years. The latest figures we have show that more than half of the USSR's enterprises are now operating under the new rules, with most of the remainder scheduled to transfer by the end of this year.

Soviet propaganda naturally has played up this so-called reform, but in reality it is only a timid step toward correcting some of the ills of the traditional system of economic administration. All of the key indicators -- output, new technology, wages, profits, and prices -- are still planned centrally,

as is the allocation of all important supplies. The new incentive schemes are extremely complicated and full of inconsistencies. Managers apparently are not going to be any more receptive to introducing new technology than they have been in the past.

Some beneficial results have been attributed to the reform thus far, but even by the Soviets' own admission these have been of a one-time nature. More specifically, the new stress on sales and profits has induced managers to reduce excess stocks of products and materials and to get rid of unneeded capital equipment. I might note that because of the chronic malfunctioning of the supply system, Soviet plant managers have long carried inventories that average a third larger than for US firms. But inventories cannot be reduced forever. Moreover, the Soviet press is replete with evidence that the ministerial bureaucracy is successfully sabotaging the relative freedom of action that the plant managers may have thought they had been given under the reform. In short, it looks now as if few important gains in efficiency will come out of the present so-called reform. Something much more radical is required, although what we call capitalism is clearly not in the cards by any means.

What Are the Prospects?

The limited nature of the current reform shows that the Soviet leadership is not about to scrap any of the essential features of the traditional command system of administration. Yet this centralized and highly bureaucratized way of running their industry is going to prove more and more of a handicap. The critical factor here, it seems to me, is that of coping with the accelerating revolution in technology -- both civilian and military -- that is now taking place. As I said earlier, the technological lag of the USSR behind Western Europe and the United States is already massive, and the gap may even be widening. Military and space programs in particular are becoming extremely sophisticated, and their ability to gobble up scarce and highly trained manpower is almost limitless. Yet the USSR seems determined to pursue the race, whatever the cost.

In the civilian field, Soviet consumers have had a little taste of the better, but not yet good, life in recent years. Their appetite for more has been whetted, and they have become increasingly choosy about what they will buy. The regime has promised them more and better consumer goods, but here again

the archaic ways of running industry by command from the top will make it increasingly difficult to produce the changing variety and assortment, not to mention the quality, of products that people will want to buy.

In conclusion, I would like to make the following summary points:

(1) Despite its shortcomings, Soviet industry has been able to provide the Kremlin leaders with formidable military and space capabilities, both of which challenge the United States.

(2) While industrial growth has fallen off in recent years, it still proceeds at a respectable rate and is about equal to that of the United States.

(3) The Soviet consumer receives far less than his counterpart in any advanced Western economy.

(4) What the Soviets have accomplished so far represents the pursuit of a simple set of priorities. But now the hard tasks are coming due, and time seems to be running out on the managerial system that Kosygin and his associates are attempting to patch up. The present command system gives no sign of being able to cope adequately with the advanced

technology of the 1970's. The Soviets must either drastically alter their system or see the technological gap widen between them and the United States, with all of the long-run military and economic implications this would have.